

The interpretation of concealed questions

Lance Nathan, MIT
WCCFL 24: March 18, 2005

1. Concealed Questions: Two New Proposals

Concealed Questions: embedded nouns with question meanings.

- (1) a. Kim knows *the capital of Vermont*.¹
(= Kim knows *what the capital of Vermont is*.)
- b. Leslie has forgotten *the price of milk*.
(= Leslie has forgotten *what the price of milk is*.)
- c. Sandy told me *the time of the meeting*.
(= Sandy told me *what the time of the meeting is*.)

Two (semi-)independent issues in interpreting CQs:

- (2) Which predicates can take CQs as complements?
 - a. John knows the price of milk.
 - b. *John wonders the price of milk.

Old answer: Predicates are individually specified for taking or not taking CQs as complements.

Proposal A: A predicate can embed a concealed question if and only if it can embed a proposition.

- (3) Which nouns can serve as CQs?
 - a. John knows the capital of Vermont.
 - b. #John knows the large city in Vermont.
(cf. *John knows what the large city in Vermont is—it's Burlington*.)
 - c. John knows the largest city in Vermont.

Old answer: Functional nouns (e.g. *time, price, capital*)

Proposal B: There are two classes of concealed questions:

- (i) Those headed by functional nouns;
- (ii) Those headed by other, *appropriately modified* nouns.

¹ There is also the irrelevant “be familiar with” reading, e.g. *Kim knows the capital of Vermont like the back of her hand*. The two are separate; one can be familiar with Montpelier without being able to identify it as the capital of Vermont, and one can identify the capital of Vermont even if one has no familiarity with the city.

The argument to come:

- Sec. 2 – a few words about previous approaches
- Sec. 3 – special case: *ask* (and Proposal B)
- Sec. 4 – special case: *care* (and Lahiri (2000))
- Sec. 5 – special case: *inform*

2. A Few Words About Previous Approaches

Proposal A: A predicate can embed a concealed question if and only if it can embed a proposition. This hypothesis is not only not obviously true, it's apparently false:

- (4) Kim {knew / asked / cared / wondered} what time it was.
- (5) a. Kim knew... the time. that it was after 5 pm.
b. Kim asked... the time. *that it was after 5 pm.
c. Kim cared... *the time. that it was after 5 pm.
d. Kim wondered... *the time. *that it was after 5 pm.

Other counterexamples: e.g., *inform (someone)* seems to pattern with *care*.)

Conventional wisdom has been that the paradigm in (5) provides evidence for the *Autonomy Hypothesis* (Grimshaw 1979). Predicates are lexically specified for *c-selection*, i.e. their possible syntactic complements (CP, DP, ...), and for *s-selection*, i.e. their possible semantic complements (Questions, Propositions, Exclamations...). The *Autonomy Hypothesis* states that the two are independent.²

(6)	c-selection	s-selection
<i>know</i>	CP, DP	Q, P
<i>ask</i>	CP, DP	Q, *P
<i>care</i>	CP, *DP	Q, P
<i>wonder</i>	CP, *DP	Q, *P

(Also: Pesetsky's (1981) *Case Theory*, which relates c-selection to Case selection.)

However, the *know/ask/care/wonder* distinction only provides evidence for the *Autonomy Hypothesis* insofar as (6) is an accurate interpretation of the data in (5). In the next three sections, I'll argue that (5) oversimplifies *ask*, *care*, and *inform*, respectively.

² Grimshaw later revised the hypothesis to account for certain correlations, but the revision does not affect the points made here.

Proposal A: A predicate can embed a concealed question if and only if it can embed a proposition.

<p><i>ask</i>: embeds concealed questions differently than <i>know</i> (Sec. 3) <i>care</i>: embeds propositions differently than <i>know</i> (Sec. 4) <i>inform</i>: embeds questions differently than <i>know</i> (Sec. 5)</p>
--

3. The Explanation of *Ask*

Ask seems to be a counterexample to Proposal A, because it embeds concealed questions but not propositions. However, by recognizing that there are two kinds of CQ distinguishable by semantic type, and that *ask* embeds one but not the other, we can see that *ask* embeds CQs differently than *know*.

3.1 The meaning of a CQ

- (1) a. Kim knows *the capital of Vermont*.
- b. Leslie has forgotten *the price of milk*.
- c. Sandy told me *the time of the meeting*.

(*what the capital of Vermont is, what the price of milk is, what the time of the meeting is*)

Concealed questions have the meaning of identity questions.

- (7) a. Leslie needed driving directions, so I told her *where the capital of Texas is*.
- b. #Leslie needed driving directions, so I told her *the capital of Texas*.
- (8) a. Alex has joined our department, so I told him *where the meeting he needs to attend is*.
- b. #Alex has joined our department, so I told him *the meeting he needs to attend*.
- (9) a. Matt is compiling a list of who saw which movies, so I told him *who saw the movie directed by Orson Welles*.
- b. #Matt is compiling a list of who saw which movies, so I told him *the movie directed by Orson Welles*.

The interpretation of
concealed questions

- (10) A: Three of these four puppies are male.
B: #Tell me the female.
(cf. *Tell me which one the female is.*)

The question denoted by a DP acting as a CQ is retrievable entirely from the NP (e.g. *capital of Texas*); if any additional information must be added (about locations, movie viewings, or puppies) to get an intended meaning, the CQ cannot have that meaning.

3.2 Functional noun CQs

A partial list of head noun + (optional) complement CQs (based on Caponigro and Heller 2003):

- (11) Tell me...
- | | |
|-------------------------------------|--------------------------------|
| the <i>governor</i> of California | Bill's <i>telephone number</i> |
| the <i>winner</i> of the marathon | the <i>color</i> of my eyes |
| the <i>outcome</i> of the trial | your <i>shoe size</i> |
| the <i>capital</i> of France | your <i>height</i> |
| the <i>location</i> of the meeting | her <i>age</i> |
| the <i>time</i> of the meeting | the <i>square root</i> of 49 |
| the <i>temperature</i> of the water | the <i>sum</i> of 8 and 9 |

These are *functional nouns* (following Heim 1977).

3.3 Appropriately modified CQs

Nouns that aren't functional nouns (*city, restaurant, etc.*) can't be CQs...

- (12) Vermont has, of course, only one capital city.
a. Let me tell you the capital of Vermont.
- Vermont has, as it happens, only one large city.
b. *Let me tell you {the city/the large city (of Vermont)}.
- (13) a. *Tell me the large city of Vermont.
b. *Tell me a city in Vermont.
c. *Tell me a good restaurant.

...unless they're modified in some way.

- (14) a. Tell me the largest city in France.
b. Tell me a city you visited last month.
c. Tell me the restaurant I must visit in Vancouver.

Proposal B: There are two classes of concealed questions:

- (i) Those headed by functional nouns;
(ii) Those headed by other, *appropriately modified* nouns.

Some ways to modify a noun (not an exhaustive list):

- Postnominal adjectives (Bolinger 1967):

- (15) a. *Sam wanted to know the responsible person.
b. Sam wanted to know the person responsible.

- Relative clauses (but not prepositional phrases):

- (16) Sam wanted to know the person who's (always so) responsible.
(17) *Sam wanted to know the responsible person in the department.

- Superlatives:

- (18) Sam wanted to know the largest city in Vermont.
(19) I saw your students heading into class the other day—the fifteen five-foot-two students and the one who's six-foot-six.
a. *I need to know the tall person in your class.
b. I need to know the tallest person in your class.

3.4 The interpretation of a CQ: explaining *ask*

- (20) a. Sam knew {the time/the capital of Vermont/the price of milk}.
b. Sam asked {the time/the capital of Vermont/the price of milk}.
- (21) a. Sam knew the person responsible.
b. *Sam asked the person responsible.
- (22) a. Sam knew the largest city in Vermont.
b. *Sam asked the largest city in Vermont.

The interpretation of
concealed questions

Know (and other proposition-embedding predicates): unambiguously combine with proposition arguments (not individuals as arguments); CQs receive propositional meanings.³

- the capital of Vermont = that the capital of Vermont is Montpelier
- the largest city in Vermont = that the largest city in Vermont is Burlington
- the person responsible = that the person responsible is Leslie

Concealed questions have the meaning of identity questions \equiv “Identity proposition”

$$(23) \quad \lambda P_{\langle e, t \rangle} . \lambda p_{\langle s, t \rangle} . [\exists x_e . p = \lambda w_s . P^w(x)] \quad \langle e, t \rangle \rightarrow \langle st, t \rangle$$

$$(24) \quad \llbracket the \rrbracket = \lambda Q_{\langle st, t \rangle} . \iota p_{\langle s, t \rangle} . [Q(p) = 1]$$

(cf. $\llbracket the \rrbracket = \lambda P_{\langle e, t \rangle} . \iota x_e . [P(x) = 1]$)

ask: embeds concealed questions differently

Functional noun NPs are *individual concepts*, of type $\langle s, e \rangle$ (= functions from worlds to individuals). *Ask* is ambiguous:

$$(25) \quad \begin{array}{ll} \text{a.} & \llbracket ask \rrbracket^w = \lambda Q_{\langle st, t \rangle} . \lambda x_e . [x \text{ asks the question } Q \text{ in } w] \\ \text{b.} & \llbracket ask \rrbracket^w = \lambda y_{\langle s, e \rangle} . \lambda x_e . [x \text{ asks the question } \lambda p_{\langle s, t \rangle} [\exists z_e . p = \lambda w' . [y(w') = z]] \text{ in } w] \end{array}$$

For instance: *Sam asked the time of the meeting* \approx Sam asked which proposition in

$$\{ \lambda w . [\text{TIME-OF-MEETING}(w) = 2:00 \text{ pm}], \lambda w . [\text{TIME-OF-MEETING}(w) = 3:00 \text{ pm}], \\ \lambda w . [\text{TIME-OF-MEETING}(w) = 4:00 \text{ pm}], \dots \}$$

is true.

4. The Explanation of *Care*

Care seems to be a counterexample to Proposal A, because it embeds propositions but not concealed questions. However, by examining *care* relative to another theory in which apparent questions are treated as propositions, we can see that *care* embeds propositions differently than *know*.

³ Inspired by, but not appearing in, Lahiri (2000); see next section.

4.1 Lahiri (2000) and Interrogative Raising

Lahiri proposed IR to account for data from Berman (1991):⁴

Quantificational Variability Effect (QVE): Quantification over a question complement by an adverb modifying the verb.

- (26) a. Sue mostly remembers what she got for her birthday.
 $\text{most}_x[\text{Sue got } x \text{ for her birthday}][\text{Sue remembers that she got } x]$
- b. #Sue mostly wonders what she got for her birthday.⁵
 $\text{most}_x[\text{Sue got } x \text{ for her birthday}][\text{Sue wonders...?}]$

Lahiri's observation: QVE verbs such as *know* and *remember* seem to be ambiguous between $\langle st, et \rangle$ and $\langle \langle st, t \rangle, et \rangle$ (i.e. between proposition-embedding predicates and question-taking predicates), whereas non-QVE verbs uniformly have the latter type. Solution:

- **Eliminate the ambiguity** in QVE verbs
know et al. have type $\langle st, et \rangle$ only; *wonder* et al. have type $\langle \langle st, t \rangle, et \rangle$ only
- **Resolve the type mismatch** between $\text{know}_{\langle st, et \rangle}$ and $\text{Question}_{\langle st, t \rangle}$
 postulate a rule of *Interrogative Raising*

Interrogative Raising (IR):
 Raise an expression with type $\langle st, t \rangle$;
 Leave behind a trace of type $\langle s, t \rangle$;
 λ -abstract over the resulting sentence to create an object of type $\langle st, t \rangle$;
 Let the QVE adverb (or an implicit adverb) relate the two sets.

Adverb type is $\langle \langle st, t \rangle, \langle \langle st, t \rangle, t \rangle \rangle \equiv \langle Pt, \langle Pt, t \rangle \rangle$ (P = proposition)

⁴ See Beck and Sharvit (2002) for a different account of QVE and for arguments against Lahiri.

⁵ There is a grammatical, felicitous reading of this sentence, where *mostly* quantifies not over the question (or its answers) but over events or situations: *At most events e, Sue wonders at e what she got for her birthday.* Such a reading is unsurprising—events and especially pluralities of events can be broken down into smaller pieces, perhaps depending on one's theory of event structure—and not relevant to the issue here.

Compare this to the familiar process of Quantifier Raising:

Quantifier Raising (QR):

Raise an expression with type $\langle et, t \rangle$;

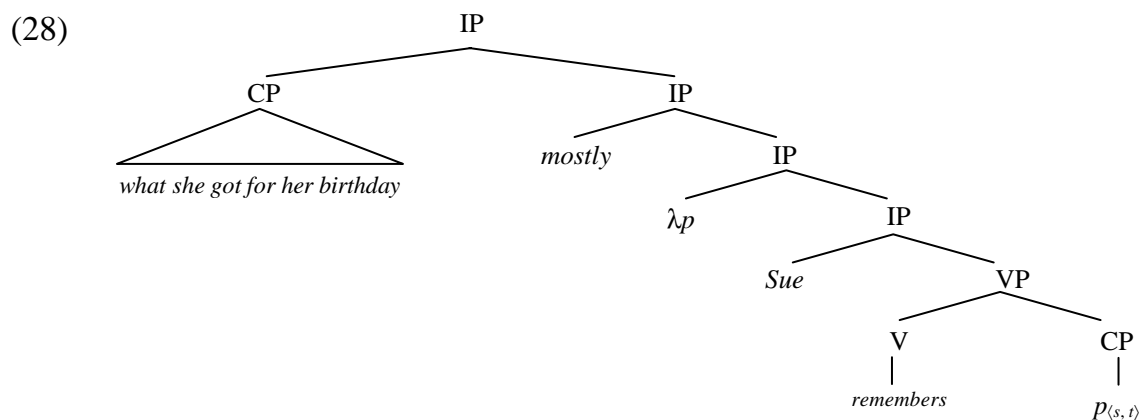
Leave behind a trace of type e ;

λ -abstract over the resulting sentence to create an object of type $\langle e, t \rangle$;

Apply the raised function to the set.

Quantifier type is $\langle et, \langle et, t \rangle \rangle$ ($e = \text{individual}$)

(27) Sue mostly remembers what she got for her birthday.



(29) $\text{most}(\lambda p[\text{Ans}(p, \llbracket \text{what she got for her birthday} \rrbracket]) \wedge C(p))(\lambda p[\text{know}(p)(\text{sue})])$

where: $\text{Ans}(p, Q)$ is true if p is an answer to Q ⁶

C is a contextual variable ($\lambda p . \checkmark p$ for factive verbs...)

4.2 A note on Lahiri's theory of IR

A problem with Lahiri's approach: IR can apply to any $\langle st, et \rangle$ predicate, not just *know* et al.

(30) #Sue mostly believes what she got for her birthday.

$\text{most}(\lambda p[\text{Ans}(p, \llbracket \text{what she got for her birthday} \rrbracket]) \wedge C(p))(\lambda p[\text{believe}(p)(\text{sue})])$

Paraphrased: for most propositions that answer the question "What did Sue get for her birthday?", Sue believes that proposition. (But of course, (30) doesn't mean this, or anything else.)

⁶ Lahiri takes the power set of propositions in the question denotation and thereby creates a Boolean algebra of propositions. For this paper, treating p as an answer to Q if $p \in Q$ will suffice.

Lahiri's answer:

[t]his is not an argument against the account developed here, but an independent question.... I assume that such information is present in the lexicon.

In other words, there must be some residual form of c-selection to distinguish *know* from *believe*.

4.3 Lexical ambiguity: explaining *care*

Even though *care* embeds propositions, it does not allow QVE:

- (31) a. Sue cares that she got a bicycle for her birthday.
b. *Sue mostly cares what she got for her birthday (but doesn't care that she got a puppy).

IR relates a question complement to the answers to the question; *know*, *remember*, and *care* are factive with propositions; but:

- (32) a. Mary knows who left \wedge John left \rightarrow Mary knows that John left
b. Mary remembers who left \wedge John left \rightarrow Mary remembers that John left
c. Mary cares who left \wedge John left \nrightarrow Mary cares that John left

- (33) a. *Mary knows that John left*: expresses a relation between Mary and a proposition
b. *Mary wonders who left*: expresses a relation between Mary and a question
c. *Mary knows who left*: expresses a relation between Mary and the answer to a question, not Mary and the question itself

- (34) a. *Mary cares that John left*: expresses a relation between Mary and a proposition
b. *Mary cares who left*: expresses a relation between Mary and a question!

(i) <i>care</i> + Proposition is lexically like <i>believe</i> (ii) <i>care</i> + Question is lexically like <i>wonder</i> \therefore <i>care</i> embeds propositions differently than <i>know</i>
--

5. The Explanation of *Inform*

Inform seems to be a counterexample to Proposal A, because like *care* it embeds propositions but not concealed questions. The explanation of the previous section won't work here, because *inform* does allow QVE. However, by examining *inform* more carefully, we can see that it embeds questions differently than *know*.

- (35) a. Kim informed Sandy where the meeting would take place.
b. Kim informed Sandy that the meeting was at 3 pm.
c. *Kim informed Sandy the time of the meeting.

And yet...

- (36) a. ?*Kim informed Sandy who the president is.
b. *Keep me informed who leaves.

Hypothesis: Case-based(?) selectional restriction on inform
Inform cannot embed who- or what-questions.

Case as a solution elsewhere—e.g., adjectives with CQs, and other predicates like *inform*:

- (37) a. Kim is certain what time it is.
b. *Kim is certain the time.
c. Kim is certain *of* the time.
- (38) a. Kim notified us *(*of*) who is in charge.
b. Kim notified us *(*of*) the time.

And therefore in the case of *inform*:

- (39) a. Kim informed Sandy *of* who the president is.
b. Keep me informed *of* who leaves.
c. Kim informed Sandy *of* the time of the meeting.

CQs are like identity questions;
Inform can only embed identity questions with *of*;
∴ *Inform* can only embed CQs with *of*, because it
embeds questions differently than *know*

6. Conclusions

- There are two classes of concealed questions.
- A predicate can embed a concealed question if and only if it can embed a proposition.

Apparent counterexamples have various explanations:

- A predicate (e.g. *ask*) may combine only with a subset of CQs, using a different mechanism.
- A predicate (e.g. *care*) may have different senses for the question-embedding form and the proposition-embedding form. (This should correlate with other facts, such as QVE.)
- A predicate (e.g. *inform*) may have particular Case requirements.

Some next steps:

- How does “appropriate” modification create a CQ meaning?
- What about cross-linguistic data?
- Specificational subjects of copulars (Romero 2003)

Selected References

- Caponigro, Ivano and Daphna Heller. 2003. "The non concealed nature of free relatives: implications for connectivity." Handout, Workshop on Direct Compositionality, Brown University, June 2003.
- Grimshaw, Jane. 1979. "Complement selection and the lexicon." *Linguistic Inquiry* 10, 279-326.
- Heim, Irene. 1979. "Concealed questions." In Rainer Bäuerle, Urs Egli, and Arnim von Stechow (eds.), *Semantics from Different Points of View*, 51-60.
- Karttunen, Lauri. 1977. "Syntax and semantics of questions." *Linguistics and Philosophy* 1, 3-44.
- Lahiri, Utpal. 2000. "Lexical selection and quantificational variability in embedded interrogatives." *Linguistics and Philosophy* 23, 325-389.
- Lahiri, Utpal. 2002. *Questions and answers in embedded contexts*. Oxford University Press.
- Romero, Maribel. 2003. "The semantics of concealed questions and specificational subjects." Handout, Workshop on Direct Compositionality, Brown University, June 2003.

Department of Linguistics and Philosophy, MIT
77 Massachusetts Ave, 32-D808
Cambridge, MA 02139

tahnan@mit.edu